



Model Question Paper

Fourth Semester BE Degree Examination

Embedded System Design

Time: 3 Hours

Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M: Marks, L: RBT (Revised Bloom's Taxonomy) level, C: Course outcomes.

Module -1			M	L	C
Q1	a.	Compare and Contrast microprocessor and microcontroller.	05	L2	CO1
	b.	Give the schematic of a Current Program Status Register of ARM7 processor briefing the individual bits.	08	L2	CO1
	c.	Along with neat diagram of an ARM based embedded device (Microcontroller), explain the four main hardware components.	07	L2	CO1
OR					
Q2	a.	What s Pipelining. Explain in detail schematically.	05	L2	CO1
	b.	Explain the different processor modes provided by ARM7.	08	L2	CO1
	c.	Explain ARM core data flow model with a neat diagram.	07	L2	CO1
Module- 2					
Q3	a.	Explain the MOV instruction set provided by ARM7 with the example for each.	08	L2	CO1
	b.	Explain the ARM swap instruction with an example code.	06	L2	CO1
	c.	Briefly Describe the classification of embedded systems	06	L2	CO2
OR					
Q4	a.	Explain the ARM Single-Register and Multiple-Register load-store addressing modes with example.	08	L2	CO1
	b.	Explain the ARM swap instruction with an example code.	06	L2	CO1
	c.	With the appropriate examples explain the concepts of Sensors, Actuators, LED and 7 segment LED display.	06	L2	CO2
Module – 3					
Q5	a.	Explain the Load/Store architecture with a detailed explanation of its pipeline concept, accompanied by a neat diagram.	06	L2	CO2
	b.	Compare and contrast the differences between RISC and CISC architectures.	06	L2	CO2
	c.	Describe the working principle of a stepper motor with an explanation of its operation.	08	L2	CO2
OR					
Q6	a.	Explain the working principle and applications of Inter-Integrated Circuit (I2C).	06	L2	CO2
	b	Enumerate and explain the primary purposes of embedded systems.	06	L2	CO2
	b.	Differentiate between active-low and active-high push buttons, and explain the operation of a 4x4 matrix keypad.	08	L2	CO2
Module – 4					
Q7	a.	Formulate a program that exemplifies the seamless integration of assembly language and high-level language within a unified application.	06	L3	CO3
	b.	Design a latch IC using logic gates to manage a multiplexed address/data bus.	08	L3	CO3
	c.	Elucidate the operational framework of the operating system based approach in embedded system design.	06	L2	CO3
OR					



Q8	a.	Synthesize an 8:1 multiplexer integrated circuit leveraging hierarchical configurations of 2:1 multiplexers.	06	L3	CO3												
	b.	Construct a 4-bit register capable of cyclically counting up to 9 distinct states, employing the principles of D flip-flops.	08	L3	CO3												
	c.	Elucidate the operational framework of the super loop-based methodology in embedded system design.	06	L2	CO3												
Module – 5																	
Q9	a.	Analyze the conceptual distinctions between the operation of processes and threads, supported by state diagram representations.	08	L4	CO4												
	b.	The processor with processor ID P1,P2,P3,P4,P5,P6with estimated completion time 10,6,5,5,4,3 ms respectively enter the ready queue with same order as above calculate Turnaround time and average waiting time for FCFS and LCFS scheduling compare and analyze the difference in the execution.	06	L4	CO4												
	c.	Analyze the Dining philosopher problem with 5 different Scenarios.	06	L4	CO4												
OR																	
Q10	a.	Illustrate the operational intricacies of multithreading with a program that integrates both the main thread and a newly instantiated thread.	08	L4	CO4												
	b.	Consider the five processes arrive at time 0, in the order given,withthelengthofCPUburstgivenin milliseconds. <table><tr><td>Process</td><td>BurstTime (msec)</td></tr><tr><td>P1</td><td>10</td></tr><tr><td>P2</td><td>29</td></tr><tr><td>P3</td><td>3</td></tr><tr><td>P4</td><td>7</td></tr><tr><td>P5</td><td>12</td></tr></table> Consider the SJF an RR (quantum = 10msec) scheduling, draw the Gantt chart for each of the scheduling. Determine average waiting time and average turnaround time for all the 3 scheduling algorithm. Compare Which algorithm would give the minimumaverage waiting time?	Process	BurstTime (msec)	P1	10	P2	29	P3	3	P4	7	P5	12	06	L4	CO4
	Process	BurstTime (msec)															
P1	10																
P2	29																
P3	3																
P4	7																
P5	12																
c.	Compare and contrast the functionalities of semaphores and mutexes in achieving process synchronization. Discuss scenarios where one is preferable over the other.	06	L4	CO4													

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